

BRIAN A. KNARR

Brian A. Knarr
Associate Professor
Department of Biomechanics
Director, [Machining and Prototyping Core](#)
Co-director, [UNO Biomechanics Pitching Lab](#)
Co-director, Biomechanics Rehabilitation and Manufacturing Initiative
Assistant Director, Center for Research in Human Movement Variability | cobre.unomaha.edu
Biomechanics Research Building | BRB 208
College of Education, Health, and Human Sciences
University of Nebraska at Omaha | coe.unomaha.edu/brb
402.554.4193

EDUCATION

University of Delaware, Newark, DE Ph.D. in Biomechanics and Movement Science	2012
University of Delaware, Newark, DE M.S. in Mechanical Engineering	2009
The College of New Jersey, Ewing, NJ B.S. in Mechanical Engineering	2006

RESEARCH AND PROFESSIONAL EXPERIENCE

Associate Professor Department of Biomechanics, University of Nebraska at Omaha	2021-Present
Assistant Professor Department of Biomechanics, University of Nebraska at Omaha	2016-2021
Associate Scientist Delaware Rehabilitation Institute, University of Delaware	2014-2016
Research Assistant Professor Biomedical Engineering, University of Delaware Biomechanics and Movement Science, University of Delaware	2014-2016
Postdoctoral Researcher Delaware Rehabilitation Institute, University of Delaware	2012-2014
Research Assistant Biomechanics and Movement Science, University of Delaware	2009-2012
Research Assistant Mechanical Engineering, University of Delaware	2006-2019

AWARDS

Funded Research Support

- University of Nebraska at Omaha Big Idea Initiative** 08/2020-08/2024
Biomechanics Rehabilitation and Manufacturing Initiative
Multiple PI: Knarr BA and Zuniga J
Total Award: \$1,270,168
- NIH INBRE/CTR Collaboration Supplement** 09/2020 – 08/2021
Wichozani-A Healthy Lifestyle for Rural American Indian Youth through Cultural and Physical Activities: A Community-Based Participatory Research Study
PI: Smith D

Subaward
PI: **Knarr BA**
Total Award: \$55,587
- NIH 1R01-NS114282** 09/2019 – 08/2023
The influence of 3D printed prostheses on neural activation patterns of the primary motor cortex in children with unilateral congenital upper-limb reductions
Multiple PI: Zuniga J and **Knarr BA**
Total Award: \$1,270,168
- NIH R01-AG056585**
Movement pattern biofeedback training after total knee arthroplasty
PI: Stevens-Lapsley J

Subaward 05/2019 – 04/2020
PI: **Knarr BA**
Total Award: \$22,000
- NIH P20-GM109090 (Phase II)** 09/2019 - 08/2024
Harnessing Movement Variability to Treat and Prevent Motor Related Disorder
PI: Stergiou N
Total Award: \$10,392,394

Machining and Prototyping Core
PI: **Knarr BA**
Total Award: \$569,590
- NIH R15-HD094194** 09/2018 – 08/2021
Impact of assistive device use during treadmill and overground walking post-stroke
PI: Knarr BA
Total Award: \$442,693
- NIH P20-GM109090 (Phase I)** 11/2016 – 04/2019
Harnessing Movement Variability to Treat and Prevent Motor Related Disorder
PI: Stergiou
Total Award: \$10,088,409

New Investigator Award
Clinical characterization of movement variability in total knee arthroplasty

PI: **Knarr BA**
Total Award: \$552,260.10

Private Funding 01/2017 – 12/2018
Upper extremity rehabilitation post-stroke using head-mounted virtual reality
PI: **Knarr BA**
Total Award: \$60,000

IDeA-CTR Pilot Grant 07/2018 – 06/2019
Development of a Wearable Intelligent System for Elderly (WISE) with fall risk
Co-PI: Youn JY, **Knarr BA**
Total Award: \$70,140

NU Collaboration Initiative 04/2017 -03/2018
Towards optimal prescription of footwear for enhanced human movement performance
PI: Takahashi K (Co-Investigator: **Knarr BA**)
Total Award: \$4,000

NU Collaboration Initiative 04/2017 – 03/2018
Clinical and Biomechanical Factors in Lower Extremity Osteoarthritis
PI: Wellsandt E (Co-Investigator: **Knarr BA**)
Total Award: \$9,825

SOCIETY MEMBERSHIPS

American Society of Biomechanics
American Society of Mechanical Engineers
American Heart Association
Gait and Clinical Movement Analysis Society

PROFESSIONAL ACTIVITIES

2018 Reviewer, American Society of Biomechanics Research Travel Grant Awards
2018 Moderator, Rocky Mountain American Society of Biomechanics
Podium Session: 'Modeling'
2015 Reviewer, Biomedical Engineering Society 2015 Annual Meeting, Orthopaedic and Rehabilitation
Engineering Abstracts
2015 Reviewer, Biomedical Engineering Society 2015 Annual Meeting, Undergraduate Research Abstracts
2015 Award Judge, Center for Biomedical Engineering Research Symposium, University of Delaware
2013 Session Co-director. Osteoarthritis Research Society International Pre-Symposium. University of
Delaware.
2013 Moderator, Center for Biomedical Engineering Research Symposium, University of Delaware

MENTORSHIP AND SERVICE

Teaching and Education Service

Chair, Undergraduate Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Member, Graduate Undergraduate Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Member, Doctoral Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Thesis Committees

Doctoral Dissertation Chair

Kim, Namwoong, 2018-Present
Ouattas, Abderrahman, 2019
Hamer, Tyler, 2019-Present
Hedrick, Erica, 2019-Present
Leutzinger, Todd, 2019-Present
Parker, Sheridan, 2020-Present

Doctoral Dissertation Committee

Choi, Jungyeon, 2020-Present
Hulburt, Tessa, 2020-Present
Jorgensen, Alyx, 2020-Present

Master's Thesis Chair

Ouattas, Abderrahman, 2016-2018
Nimtz, Katlyn, 2016-2018
Dudley, Drew, 2017-2019
Hamer, Tyler, 2017-2019
Buffum, Russell, 2018-Present
Parker, Sheridan, 2018-Present
Remski, Lindsey, 2019-Present
Hultine, Shane, 2020-Present
Eggleston, Garrett, 2020-Present
Scott, Angeleau, 2020-Present
Kinney, Taylor, 2020-Present

Master's Thesis Committee Member

Ide, Tomohiro, 2021
Bixler, Kellie, 2021
Janicek, Cheyenne, 2020-2021
Miller, Sarah, 2020-2021
Choe, SeokJae, 2020
Cortez Reyes, Claudia, 2020
Beier, Blake, 2018-2020
Chung, Sunghoon, 2019-2020
Ray, Samuel, 2016-2019
Jang, Jaeho, 2018-2019
Henrickson, Jayson, 2018

Undergraduate Students

Internship Advisor

Madison Mingo, University of South Dakota, Summer 2020
Lindsey Remski, Grand Valley State University, Spring 2019

Jenna Ackerman, University of Nebraska Kearney, Spring 2019

Research Advisor

Abby Meier, University of Nebraska at Omaha. Department of Biomechanics, 2021-Present
Luke Capoun, University of Nebraska at Omaha. Department of Biomechanics, 2020-Present
Luke Partusch, University of Nebraska at Omaha. Department of Biomechanics, 2020-Present
Sadie Limback, University of Nebraska at Omaha. Department of Biomechanics, 2020-Present
Katie Andersen, University of Nebraska at Omaha. Department of Biomechanics, 2019-Present
Breanna Strunc, University of Nebraska at Omaha. Department of Biomechanics, 2019
Jaclyn Taylor, University of Nebraska at Omaha. Department of Biomechanics, 2019
Ben Frazier, University of Nebraska at Omaha. Department of Biomechanics, 2018-Present
Katlyn Guhl, University of Nebraska at Omaha. Department of Biomechanics, 2018-Present
Sydney Andreasen, University of Nebraska at Omaha. Department of Biomechanics, 2018-Present
Monica Barajas, University of Nebraska at Omaha. Health and Kinesiology. 2017-2019.
Matt Harrison, University of Nebraska at Omaha. Department of Neuroscience. 2017.
Russell Buffum, University of Nebraska at Omaha. Department of Mathematics. 2017-2018.
Samantha Sack, University of Nebraska at Omaha. Department of Biomechanics. 2017.
Mason Schleu, University of Nebraska at Lincoln. Computer Science and Engineering. 2016-2018.
Boman Groff, University of Nebraska at Omaha. Department of Neuroscience. 2016-2017.
Connor Reed, University of Nebraska at Omaha. Department of Biomechanics. 2016-2017.
Maria Nicholson, University of Delaware. CBER Summer Undergraduate Research Fellowships 2014, 2015
Gillian McCarren, Towson University. Delaware INBRE Summer Scholars Program. 2015.
William Justice, Delaware State University. Delaware INBRE Summer Scholars Program. 2015.
Michaela Schulman, University of Delaware. Delaware Rehabilitation Institute Summer Scholars. 2015.
Lydia Zakutney, University of Delaware. Biomedical Engineering. 2015
Collin Patterson, University of Delaware. Biomedical Engineering. 2015
Mary Doolin, University of Delaware. Delaware Rehabilitation Institute Summer Scholar 2014.
Victoria Stanhope, University of Delaware. Mechanical Engineering. 2012-13
Laura van der Post, University of Delaware. Mechanical Engineering. 2012-13

Senior Design/Capstone Advisor

University of Nebraska at Omaha, 2018-2021
University of Delaware, 2014

AD HOC REVIEWER

Grant Reviewer

National Institutes of Health

Study Section, Small Business Grants (Musculoskeletal, Oral, Skin, Rheumatology, Orthopedic, Rehab)

Czech Science Foundation (GACR), Reviewer, EXPRO Project Proposals

Academic Journals

Archives of Rehabilitation Research and Clinical Translation

Journal of Biomechanics

Journal of Applied Biomechanics

Electromyography and Kinesiology

Biomedical Engineering Society

PLOS ONE

Gait and Posture

Conferences

Biomedical Engineering Society, Abstract Reviewer
American Society of Biomechanics, Travel Award Reviewer

Moderator

Moderator, Rocky Mountain American Society of Biomechanics, Podium Session: 'Modeling'
Moderator, Center for Biomedical Engineering Research Symposium, University of Delaware

MEDIA

The Gateway. 05/04/2021. Into the Lab: How a state-of-the-art facility aims at giving Maverick pitchers an edge on the competition. <https://unothegateway.com/into-the-lab-how-a-state-of-the-art-facility-aims-at-giving-maverick-pitchers-an-edge-on-the-competition/>

Omaha World Herald. 08/10/2019. With Hollywood motion capture, Omaha researcher creates virtual reality for kids with disabilities. https://www.omaha.com/livewellnebraska/with-hollywood-motion-capture-omaha-researcher-creates-virtual-reality-for/article_424d3c8d-9046-5f48-8fb8-810d2ca8ec84.html

UNO College of Education News. Biomechanics In Action (Biomechanics-QLI Partnership).
<https://www.unomaha.edu/college-of-education/news/2018/11/biomechanics-qli-partnership.php>

UNO College of Education News. Biomechanics professor receives nearly \$500K from the NIH to study role of assistive devices in stroke recovery. <https://www.unomaha.edu/college-of-education/news/2018/12/knarr-receives-r15.php>

UDaily 07/14/2015. *SmartBoot: Engineering students add high-tech function to low-tech orthopedic boot*, by Diane Kukich. <http://www.udel.edu/udaily/2016/jul/smartboot-071415.html>

The O&P EDGE, OANDP.COM. 07/23/15. *University Students Develop Orthopedic Boot With "Smart" Features.*
http://www.oandp.com/articles/NEWS_2015-07-23_06.asp

Tech Times 07/17/2015. *University Of Delaware Students Design Boot That Helps Heal Broken Bones*, by [J.E. Reich](#)
<http://www.techtimes.com/articles/69836/20150717/university-delaware-students-design-boot-helps-heal-broken-bones.htm>

The Osgood File. 08/04/15. *A SMARTBOOT TO HEAL INJURED FEET.* www.theosgoodfile.com. Show archive:
<http://www.westwood-backup.com/pg/jsp/osgood/transcript.jsp?pid=41273>

The Philadelphia Inquirer. Philly.com. 11/08/2015. *High-tech boot could speed healing*, by Tom Avril.
http://articles.philly.com/2015-11-09/news/68110626_1_higginson-patients-sensors

PUBLICATIONS AND PAPERS

1. Kim N, Lee SY, Lee SC, Rosen AB, Grindstaff TL, **Knarr BA**. Effect of isolated hip abductor fatigue on single-leg landing mechanics and simulated ACL loading. *The Knee*. 2021 Aug 1;31:118-26.
2. Rosen AB, Buffum R, **Knarr BA**. Development and Validation of a Leg Press Force Measuring Device to Assess Limb Strength Asymmetry. *Athletic Training & Sports Health Care*. 2021 Feb 17.
3. Hedrick EA, Parker SM, Hsiao H, **Knarr BA**. Mechanisms used to increase propulsive forces on a treadmill in older adults. *Journal of Biomechanics*. 2021 Jan 22;115:110139.

4. Rosen AB, Buffum R, **Knarr BA**. Development and Validation of a Leg Press Force Measuring Device to Assess Limb Strength Asymmetry. *Athletic Training & Sports Health Care*. In Press.
5. Andreassen SC, Wright TR, Crenshaw JR, Reisman DS, **Knarr BA**. Relationships of Linear and Non-linear Measurements of Post-stroke Walking Activity and Their Relationship to Weather. *Frontiers in Sports and Active Living*. 2020 Nov 3;2:157.
6. Youn IH, Leutzinger T, Youn JH, Zeni JA, **Knarr BA**. Self-Reported and Performance-Based Outcome Measures Estimation Using Wearables After Unilateral Total Knee Arthroplasty. *Frontiers in Sports and Active Living*. 2020;2.
7. Vaz JR, Knarr BA, Stergiou N. Gait complexity is acutely restored in older adults when walking to a fractal-like visual stimulus. *Human movement science*. 2020 Dec 1;74:102677.
8. Youn IH, Leutzinger T, Youn JH, Zeni JA, **Knarr BA**. Self-Reported and Performance-Based Outcome Measures Estimation Using Wearables After Unilateral Total Knee Arthroplasty. *Frontiers in Sports and Active Living*. 2020;2.
9. Lanier AS, **Knarr BA**, Stergiou N, Snyder-Mackler L, Buchanan TS. ACL injury and reconstruction affect control of ground reaction forces produced during a novel task that simulates cutting movements. *Journal of Orthopaedic Research®*. 2020 Jan 23.
10. Dudley DR, **Knarr BA**, Siu KC, Peck J, Ricks B, Zuniga JM. Testing of a 3D printed hand exoskeleton for an individual with stroke: a case study. *Disability and Rehabilitation: Assistive Technology*. 2019 Aug 5:1-5.
11. McGrath RL, Ziegler ML, Pires-Fernandes M, **Knarr BA**, Higginson JS, Sergi F. The effect of stride length on lower extremity joint kinetics at various gait speeds. *PLOS ONE*. 2019.
12. Ouattas A, Wellsandt E, Hunt NH, Boese CK, **Knarr BA**. Comparing single and multi-joint methods to detect knee joint proprioception deficits post primary unilateral total knee arthroplasty. *Clinical Biomechanics*. 2019 Jun 14.
13. Kennedy C, Higginson C, Valenti M, Ibrahim K, **Knarr B**, Ryan R, Higginson J. A-12 Neuroticism and Extraversion are Related to Dual Task Postural Stability in Healthy Young Adults. *Archives of Clinical Neuropsychology*. 2019 Jul 25;34(6):871.
14. Kempster KM, Ray NT, **Knarr BA**, Higginson JS. Dynamic structure of variability in joint angles and center of mass position during user-driven treadmill walking. *Gait & posture*. 2019 Jun 1;71:241-4.
15. Jafarnehzadgero AA, Majlesi M, Etemadi H, Hilfiker R, **Knarr BA**, Shad MM. Effect of 16-week corrective training program on three dimensional joint moments of the dominant and non-dominant lower limbs during gait in children with genu varus deformity. *Science & Sports*. 2020 Feb 1;35(1):44-e1.
16. Vaz JR, Groff BR, Rowen DA, **Knarr BA**, Stergiou N. Synchronization dynamics modulates stride-to-stride fluctuations when walking to an invariant but not to a fractal-like stimulus. *Neuroscience letters*. 2019 Jun 21;704:28-35.
17. Groff BR, Antonellis P, Schmid KK, **Knarr BA**, Stergiou N. Stride-time variability is related to sensorimotor cortical activation during forward and backward walking. *Neuroscience letters*. 2019 Jan 23;692:150-8.
18. Lanier AS, **Knarr BA**, Stergiou N, Buchanan TS. A Novel and Safe Approach to Simulate Cutting Movements Using Ground Reaction Forces. *Sensors* 2018, 18(8), 2631. PMID: 30103484
19. Ray NT, **Knarr BA**, Higginson JS. Walking speed changes in response to novel user-driven treadmill control. *J Biomech*. 2018:Jul 29. PMID: 30078637
20. Youn I-H, Youn J-H, Zeni J, **Knarr B**. Biomechanical Gait Variable Estimation Using Wearable Sensors after Unilateral Total Knee Arthroplasty. *Sensors*. 2018;18(5):1577. doi:10.3390/s18051577.
21. Zuniga JM, Dimitrios K, Peck JL, Srivastava R, Pierce JE, Dudley DR, Salazar DA, Young KJ, **Knarr BA**. Coactivation index of children with congenital upper limb reduction deficiencies before and after using a wrist-driven 3D printed partial hand prosthesis. *J Neuroeng Rehabil*. 2018;15(1):48. doi:10.1186/s12984-018-0392-9.
22. Grindle DM, Baker L, Furr M, Puterio T, **Knarr BA**, Higginson JS. The Effects Of Walking Workstations On Biomechanical Performance. *J Appl Biomech*, 2018 10:1:1-18 PMID: 29613820.
23. Kempster K, Awad LN, Buchanan TS, Higginson JS, **Knarr BA**. Dynamic structure of lower limb joint angles during walking post-stroke. *J Biomech*. 2018;68:1-5. doi:10.1016/j.jbiomech.2017.12.019.
24. McGrath RL, Pires-Fernandes M, **Knarr BA**, Higginson JS, Sergi F. Toward goal-oriented robotic gait training: the effect of gait speed and stride length on lower extremity joint torques. *IEEE Int Conf Rehabil Robot*, 2017 Jul;2017:270-275. PMID: 28813830
25. Richardson RT, Rapp EA, Quinton RG, Nicholson KF, **Knarr BA**, Russo SA, Higginson JS, Richards JG. Errors associated with utilizing prescribed scapular kinematics to estimate unconstrained, natural upper extremity motion in musculoskeletal modeling. *Journal of applied biomechanics*. 2017 Dec 1;33(6):469-73.

26. HY Hsiao, **BA Knarr**, JS Higginson, RT Pohlig, SA Binder-Macleod . Mechanisms used to increase peak propulsive force following 12-weeks of gait training in individuals poststroke. *Journal of Biomechanics*, 2016 Feb 8;49(3):388-95. PMID: PMC4761516
27. HY Hsiao, **BA Knarr**, JS Higginson, SA Binder-Macleod. Mechanisms to increase propulsive force for individuals poststroke. *Journal of NeuroEngineering and Rehabilitation*, 2015 Apr 18;12:40. doi: 10.1186/s12984-015-0030-8. PMID: PMC4406180
28. Eitzen I, Kallerud H, Fernandes L, Nordsletten L, **Knarr BA**, Risberg MA. Gait pattern, symptoms and function in hip osteoarthritis subjects who do not undergo total hip replacement: 6-7 year follow-up. *J Orthop Sports Phys Ther*. 2015;45(7):539-549
29. **Knarr BA**, Higginson JS. Practical approach to subject-specific estimation of knee joint contact force. *Journal of Biomechanics*, 2015 Aug 20;48(11):2897-902. PMID: PMC4536092
30. **Knarr BA**, Higginson JS, Zeni JA. Changes in knee contact force with simulated change in body weight. *Computer Methods in Biomechanics and Biomedical Engineering*, 2015 Mar 11:1-4. DOI: 10.1080/10255842.2015.1018193. PMID: 25760517
31. HY Hsiao, **BA Knarr**, JS Higginson, SA Binder-Macleod. The relative contribution of ankle moment and trailing limb angle to propulsive force during gait. *Human Movement Science*, 2015 Feb;39:212-21 PMID: 25498289 PMID: PMC4272868
32. Stanhope VA, **Knarr BA**, Reisman DS, Higginson JS. Frontal plane compensatory strategies associated with self-selected walking speed in individuals post-stroke. *Clinical Biomechanics*, 2014 May;29(5):518-22. PMID: 24768223
33. **Knarr BA**, Reisman DS, Binder-Macleod SA, Higginson JS. Changes in Predicted Muscle Coordination with Subject-Specific Muscle Parameters for Individuals after Stroke. *Stroke Research and Treatment*, 2014;2014:321747. PMID: 25093141 PMID: PMC4096388
34. **Knarr BA**, Roos MA, Reisman DS. Sampling frequency impacts the measurement of walking activity after stroke. *J Rehabil Res Dev*, 2013;50(8):1107-12. PMID: 24458896
35. **Knarr BA**, Ramsay JW, Buchanan TS, Higginson JS, Binder-Macleod SA. Muscle volume as a predictor of maximum force generating ability in the plantar flexors post-stroke. *Muscle and Nerve*, 2013 Dec;48(6):971-6. PMID: 23494851
36. **Knarr BA**, Reisman DS, Binder-Macleod SA, Higginson JS. Understanding compensatory strategies for muscle weakness during gait by simulating activation deficits seen post-stroke. *Gait and Posture*, 2013 Jun;38(2):270-5. PMID: 23273489 PMID: PMC3625686
37. **Knarr BA**, Kesar TM, Reisman DS, Binder-Macleod SA, Higginson JS. Changes in activation and function of the ankle plantarflexor muscles due to gait retraining in chronic stroke survivors. *Journal of NeuroEngineering and Rehabilitation*, 2013 Jan 31;10:12. . PMID: 23369530 PMID: PMC3565909
38. **Knarr BA**, Zeni JA, Higginson JS. Comparison of Electromyography and Joint Moment as Indicators of Co-contraction. *Journal of Electromyography and Kinesiology*, 2012 Aug;22(4):607-11. PMID: 22382273 PMID: PMC3506260
39. **Knarr BA**, Higginson JS, Binder-Macleod, SA. Validation of adjustment equation for the burst superimposition technique in subjects post-stroke. *Muscle and Nerve*, 2012 Aug;46(2):267-9. PMID: 22806377 PMID: PMC3400120
40. Sions M, Malecka C, **Knarr BA**, Jancosko A, Binder-Macleod SA. Age- and Stroke-Related Skeletal Muscle Changes: A Review for the Geriatric Clinician. *Journal of Geriatric Physical Therapy*, 2012 Jul-Sep;35(3):155-61. PMID: 22107952 PMID: PMC3290755
41. Flynn S, **Knarr BA**, Perumal R, Kesar TM, Binder-Macleod SA. Using submaximal contractions to predict the maximum force generating ability of muscles. *Muscle and Nerve*, 2012 Jun;45(6):849-58. PMID: 22581539 PMID: PMC3353723.

INVITED SEMINARS

1. **Knarr BA**. Applying Research Across Populations: How Stroke And Total Knee Replacement Are The Same, Yet Different. The Department of Biomechanics and the Center for Research in Human Movement Variability Seminar Series. Omaha, NE, April 20, 2017.

2. **Knarr BA.** Informing Rehabilitation Through Musculoskeletal Modeling. Opportunities for Collaboration between Engineering & Medicine in M&S. 16th Annual IEEE International Conference on Electro Information Technology. Lincoln, NE, 2017
3. **Knarr BA.** Closing the Loop: Translating Rehabilitation into the Clinic. Center for Research in Human Movement Variability Seminar Series, University of Nebraska at Omaha, March 2016.
4. Higginson JS, **Knarr BA.** Subject-specific Parameters and the Prediction of Knee Joint Contact Force Using Musculoskeletal Modeling. World Congress of Biomechanics, Boston, Massachusetts, July 2014.
5. Higginson JS, **Knarr BA,** Ramsay J. Measuring and Incorporating Subject-Specific Muscle Parameters in Post-Stroke Gait Simulations. OpenSim Webinar Series, Stanford University, September 17, 2013.
6. Manal K, **Knarr BA.** Gait Analysis and Knee Contact Force Modeling. Osteoarthritis Research Society International Pre-Symposium, University of Delaware, April 17, 2013.
7. **Knarr BA.** Research Applications Using Multi-Body Dynamic Musculoskeletal Models. Biomechanics and Movement Science Seminar Series, University of Delaware, April 19, 2013.

NATIONAL AND INTERNATIONAL CONFERENCE ABSTRACTS

1. Kim N, Leutzinger T, **Knarr BA.** Muscle Contributions to Knee Joint Reaction Forces and Moments during Single-leg Landing. American Society of Biomechanics, August 2020.
2. Hedrick, EA, Buffum R, Reisman DS, Bierner S, **Knarr BA.** Functional level Alters the Impact of Assistive Device Use on Propulsive Impulse Post-Stroke. American Society of Biomechanics, August 2020.
3. Parker S, Hedrick E, **Knarr BA.** Kinematic Response to Adaptive Speed Treadmill versus Fixed Speed Treadmill Walking in Older Adults. American Society of Biomechanics, August 2020.
4. Leutzinger TJ, Hedrick E, **Knarr BA.** Walking with a Cane Alters Plantar flexor Muscle Forces During Walking In An Individual Post-stroke. American Society of Biomechanics, August 2020.
5. Remski L, Buffum R, Lanier AS, Rosen AB, **Knarr BA.** Use of Nonlinear Dynamics to Characterize Force Control during Leg Press Exercise. American Society of Biomechanics, August 2020.
6. Hedrick, EA, Buffum R, Reisman DS, Bierner S, **Knarr BA.** The Interaction of Propulsive Assistive Device to Propulsive Limb Forces During Walking Post-Stroke. Biomedical Engineering Society 2020
7. Parker S, Leutzinger T, Lacy B, Ricks B, Zuniga J, **Knarr B.** Use Of Virtual Reality For Assessing Gross Hand Dexterity In Young Healthy Individuals. Summer Biomechanics, Bioengineering, and Biotransport Conference 2020.
8. Choi J, Ouattas A, Parker S, Youn J, **Knarr B.** Elderly's Walking Classification between Indoors and Outdoors using Deep Neural Networks. Biomedical Engineering Society. October 2019. Philadelphia, PA.
9. Kim N and **Knarr BA.** Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. International Society of Biomechanics and American Society of Biomechanics, August 2019. Calgary, Canada.
10. Ouattas A, Parker S, Youn J, **Knarr B.** Are the outside stability measures as sensitive as the inside measures? American Society of Biomechanics & International Society of Biomechanics combined annual meeting, August 2019, Calgary, Alberta, Canada.
11. Parker S, Ouattas A, Youn JH, **Knarr BA.** Comparison of Nonlinear Lower Limb Joint Variability using IMU and Motion Capture Based Kinematics. International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
12. Hamer T, Ouattas A, Nimitz K, Boese K, **Knarr BA.** Relationships Between Joint Angle Variability Across Terrains and Knee Arthroplasty Satisfaction. International Society of Biomechanics (ISB), August 2019. Calgary, Alberta, Canada.
13. Silva L, Likens AD, Rowen D, Vaz JR, **Knarr B,** Stergiou N. Synchronization between Stride Time Intervals and External Visual Cueing. International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
14. Silva L, Likens AD, Rowen D, Vaz JR, **Knarr B,** Stergiou N. Multifractal Analysis of Visually Cued Stride Intervals International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
15. Rosen AB, Buffum R, **Knarr B.** Validation of a Leg Press Force Measuring Device to Assess Limb Strength Asymmetry. World Federation of Athletic Training & Therapy, May 2019. Tokyo, Japan.
16. Kempfski K, **Knarr BA,** Higginson JS. Dynamic Structure of Variability of Joint Angles on Split-Belt User-Driven Treadmill. Biomedical Engineering Society, October 2018. Atlanta, Georgia.
17. Hamer T, Ouattas A, Nimitz K, **Knarr BA.** Examining the minute-to-minute predictability of walking distance and local joint stability across multiple surfaces. American Society of Biomechanics, August 2018. Rochester, Minnesota.

18. Rowen DA, Vaz JR, **Knarr BA**, Stergiou N. Walking with Visual Cueing Affects Cortical Hemodynamics. American Society of Biomechanics, August 2018. Rochester, Minnesota.
19. Kempfski KM, **Knarr BA**, Higginson JS. Propulsive and Braking Impulse with Induced Asymmetric Gait and User-Driven Treadmill Control. American Society of Biomechanics, August 2018. Rochester, Minnesota.
20. Awad L, **Knarr BA**, Kudzia P, Buchanan TS. Speed-based Changes to Walking Stability and Economy May Explain Preferred Walking Speed after Stroke. 2018 World Congress of Biomechanics, July 2018. Dublin, Ireland.
21. Ray NT, **Knarr BA**, Higginson JS. Response of Stroke Survivors to Novel User-Driven Treadmill Control. 2018 World Congress of Biomechanics, July 2018. Dublin, Ireland.
22. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. 2018 World Congress of Biomechanics. July 2018. Dublin, Ireland.
23. Young E, Clowers A, Ricks B, **Knarr BA**, Dexter B. Novel Clinical Application of Virtual Reality Technology through Community Partnerships. Rehabilitation Engineering and Assistive Technology Society of North America Annual Conference. Arlington, VA. July 2018.
24. Ouattas A, **Knarr BA**. Knee Proprioception Impairments and its Effect on Balance Post Total Knee Arthroplasty. Progress in Clinical Motor Control I: Neurorehabilitation. July 2018. State College, PA.
25. Grindstaff TL, Chaput M, Farmer B, Anderson K, Lanier AS, **Knarr BA**, Wichman C, Turman KA. Symmetrical Knee Joint Stride-to-Stride Variability During Running Predicts Patient Function Following Anterior Cruciate Ligament Reconstruction. NATA 69th Clinical Symposia & AT Expo. June 2018. New Orleans, LA.
26. Grindstaff TL, Chaput M, Farmer B, Anderson K, Lanier AS, **Knarr BA**, Wichman C, Turman KA. Decreased gait variability following anterior cruciate ligament reconstruction negatively impacts patient function. American College of Sports Medicine 65th Annual Meeting. June 2018. Minneapolis, MN.
27. Youn IH, Zeni JA, Youn JH, **Knarr BA**. Self-report and Performance Measure Outcome Estimation Using Wearables after Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
28. Youn IH, Zeni JA, Youn JH, **Knarr BA**. Biomechanical Gait Variable Estimation Using Wearables after Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
29. Ouattas A, Ray NT, Zeni JA, **Knarr BA**. Spatial-Temporal Measurements Indicate Knee Loading Asymmetry After Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
30. Ray NT, **Knarr BA**, Higginson JS. Contributions to Increased Walking Speed During Fixed and User-Driven Treadmill Walking. American Society of Biomechanics, August 2017. Boulder, CO.
31. Groff B, Antonellis P, **Knarr BA**, Stergiou N. Movement Variability and Sensorimotor Cortical Activation During Forward and Backward Walking. American Society of Biomechanics, August 2017. Boulder, CO.
32. Ray NT, **Knarr BA**, Higginson JS. Walking Speed Changes in Response to User-Driven Treadmill Control. Summer Biomechanics, Bioengineering and Biotransport Conference. June 2017. Tucson, AZ.
33. Youn IH, Youn JH, Siu KC, **Knarr BA**, Choi J. Wearable sensor-based 48-Hour activity and gait monitoring in the acute care setting. International Conference on Ambulatory Monitoring of Physical Activity and Movement, June 2017. Bethesda, MD.
34. Ray NT, Marmon AR, Zeni JA, **Knarr BA**. Detection of Loading Asymmetry after TKA using Tibial Acceleration. American Society of Biomechanics Conference, August 2016. Raleigh, NC.
35. Richardson RT, Quinton R, **Knarr BA**, Russo S, Higginson JS, Richards R. A comparison of model-predicted muscle activations with electromyography during shoulder abduction. American Society of Biomechanics Conference, August 2016. Raleigh, NC.
36. Richardson RT, **Knarr BA**, Higginson JS, Richards JG. Glenohumeral abduction and flexion moment arms: a verification study of a new musculoskeletal model of the shoulder. American Society of Biomechanics Conference, August 2015. Columbus, OH.
37. West TK, Schenk ME, Schnall DA, O'Brien ME, Groome MA, Singh A, Higginson JS, **Knarr BA**. SmartBoot: An Instrumented Clinical Walking Boot for Partial Weight Bearing Training. Summer Biomechanics, Bioengineering and Biotransport Conference, June 2015, Snowbird Resort, Utah. (*3rd Place, Undergraduate Design Competition*).
38. Doolin M, Higginson JS, **Knarr BA**. Evaluation of multiple training paradigms when using biofeedback for learning partial weight bearing. Gait and Clinical Movement Society, March 2015, Portland, Oregon.
39. Richardson RT, **Knarr BA**, Higginson JS, Richards JG. Evaluation of glenohumeral muscle moment arms of a new musculoskeletal model of the shoulder and upper extremity. Gait & Clinical Movement Analysis Society. March 2015. Portland, OR.

40. **Knarr BA**, Awad L, Reisman DS. Training with Real-Time Visual Feedback of Propulsive Force in Post-Stroke Individuals: A Case Study. Gait and Clinical Movement Society, June 2014, Newark, DE.
41. Eitzen I, Kallerud H, Fernandes L, Nordsletten L, **Knarr BA**, Risberg M. Gait, Symptoms and Function in Patients with Mild to Moderate Hip Osteoarthritis: 6-7 Year Follow-up. OARSI World Congress on Osteoarthritis. April 2014. Paris, France.
42. Brandis C, Awad LN, Hsiao H, Marion MS, Kesar TM, **Knarr BA**, Higginson JS, Binder-Macleod SA. The Effects of Fatigue on Post-Stroke Muscle Force Production and Center of Mass Acceleration: A Musculoskeletal Simulation Analysis. Computer Methods in Biomechanics and Biomedical Engineering. April 2013, Salt Lake City, Utah.
43. **Knarr BA**, Reisman DS, Binder-Macleod SA, Higginson JS. Changes in Model-Predicted Muscle Activation with Subject Specific Parameters for Individuals Post-Stroke. Computer Methods in Biomechanics and Biomedical Engineering. April 2013, Salt Lake City, Utah.
44. **Knarr BA**, Higginson JS. The Ability of a Residual Reduction Algorithm to Account for Handrail Use During Gait Analysis. American Society of Mechanical Engineering Summer Bioengineering Conference, June 2012, Fajardo, Puerto Rico.
45. **Knarr BA**, Ramsay J, Buchanan TS, Binder-Macleod SA, Higginson JS. Quantification of atrophy and activation failure in the plantar flexors post-stroke. American Society for Biomechanics Meeting, August 2011, Long Beach, CA.
46. **Knarr BA**, Kesar TM, Helm E, Reisman DS, Binder-Macleod, SA, Higginson, JS. Simulation detects changes in muscle activation in post-stroke gait after a functional electrical stimulation intervention. American Society for Biomechanics Meeting, August 2010, RI.
47. **Knarr BA**, Zeni J, Higginson JS. Comparison of Electromyography and Joint Moment as Indicators of Co-contraction. Gait and Clinical Movement Society, May 2010, Miami, FL.
48. **Knarr BA**, Higginson JS. Muscle compensation strategies with plantar flexor and dorsiflexor activation impairment. Gait and Clinical Movement Society, May 2010, Miami, FL.
49. **Knarr BA**, Novotny JE. Protective Strategies Revealed from Stress Distributions in Subject-Specific Finite Element Models of Skeletal Muscle. Orthopaedic Research Society, February 2009, Las Vegas, NV.
50. Novotny JE, **Knarr BA**, Zhou H. Maximum contractile strain in the biceps brachii is bounded by sarcomere geometry. Summer Bioengineering Conference 2008, ASME. Marco Island, FL, USA
51. Novotny JE, **Knarr BA**, Zhou H. Biceps Brachii Muscle Strains Show Simultaneous Concentric, Eccentric, and Isometric Behavior during Elbow Flexion-Extension. The Orthopaedic Research Society meeting, 2008 Transactions Vol.33, San Francisco, CA/
52. Novotny JE, **Knarr BA**, Zhou H. Observing strain distributions in skeletal muscle with CPC-MRI. Biomedical Engineering Society Annual Fall Meeting 2007, Los Angeles, CA, USA
53. Novotny JE, **Knarr BA**, Zhou H. Strains in the biceps brachii during dynamic elbow flexion show concentric, eccentric and isometric behavior simultaneously. American Society for Biomechanics Meeting, August 2007, Palo Alto, CA.

REGIONAL RESEARCH CONFERENCES

54. Kempinski KM, **Knarr BA**, Higginson JS. Propulsive and Braking Impulse with Induced Asymmetric Gait & User-Driven Treadmill Control. American Society of Biomechanics East Coast Conference. April 2018. Reading, PA. *(Winner: Best Undergraduate Poster Award)*
55. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. American Society of Biomechanics East Coast Conference. April 2018. Reading, PA.
56. Nimtz K, Ouattas A, **Knarr BA**. Linear and Nonlinear Analysis on Activity Data Relationships to Clinical Measures in Older Adults. Rocky Mountain American Society of Biomechanics, April 2018. Estes Park, CO.
57. Hamer T, Ouattas A, Nimtz K, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. Rocky Mountain American Society of Biomechanics, April 2018. Estes Park, CO.
58. Nimtz K, Ray NT, Zeni, JA, **Knarr BA**. Differences in correlation between variability of knee kinematics and clinical outcome measures in post-TKA patients. Rocky Mountain American Society of Biomechanics, April 2017. Estes Park, CO.

59. Ouattas A, **Knarr BA**, Majed L. Comparison of static and dynamic linear accuracy between the 'Precision Position Tracking' and Vicon motion capture systems: A validation study. Rocky Mountain American Society of Biomechanics, April 2017. Estes Park, CO.

UNIVERSITY RESEARCH CONFERENCES

60. Remski L, Buffum R, Lanier AS, Rosen A, **Knarr BA**. Force production variability during leg press in healthy individuals. Human Movement Variability Conference, May 2020. Omaha, Nebraska.
61. Andreasen SC, Wright T, Crenshaw JR, Reisman DS, **Knarr BA**. The effect of weather on linear and nonlinear measures of activity in stroke survivors. Student Research and Creative Activity Fair, March 2020. Omaha, Nebraska.
62. Andreasen S, Wright T, Crenshaw J, Reisman D, **Knarr B**. The effect of season and precipitation on physical activity amount, structure, and complexity in stroke survivors. Human Movement Variability Conference and Great Plains Biomechanics Conference, September 2020. Omaha, Nebraska.
63. Parker SM, Hedrick E, Andreasen S, **Knarr BA**. Response of medio-lateral center of mass variability between laboratory and outdoor walking environments. Human Movement Variability Conference, September 2020. Omaha, Nebraska
64. Hedrick, EA, Buffum, R, Reisman, DS, Bierner, S, **Knarr, BA**. Assistive Device Use Affects Peak Propulsive Forces in Individuals Post-Stroke. Human Movement Variability Conference and Great Plains Biomechanics Conference, September 2020, Omaha, Nebraska
65. Hedrick, EA, Buffum, R, Reisman, DS, Bierner, S, **Knarr, BA**. The utilization of assistive devices during walking post-stroke impacts propulsive forces. Student Research and Creative Activity Fair, March 2020, University of Nebraska at Omaha, Omaha, Nebraska
66. Leutzinger T, Christensen J, Christiansen C, **Knarr B**, Stevens-Lapsley J. Subject-Specific Strength And Knee Alignment Angle To Improve Knee Joint Contact Force Predictions In Individuals Post Total Knee Arthroplasty. Research and Creative Activities Fair, March 2020. Omaha, Nebraska.
67. Leutzinger T, Christensen J, Christiansen C, **Knarr B**, Stevens-Lapsley J. Subject-Specific Strength And Knee Alignment Angle To Improve Knee Joint Contact Force Predictions In Individuals Post Total Knee Arthroplasty. Human Movement Variability Conference, September 2020. Omaha, Nebraska.
68. Kim N and **Knarr BA**. Effect of Isolated Hip abductor Fatigue on Single-leg Landing Mechanics and Simulated ACL Loading. Student Research and Creative Activity Fair, March 2020. Omaha, Nebraska.
69. Ackerman J, Remski L, Buffum R, Ouattas A, **Knarr BA**. Effect of handrail strategies on ground reaction forces during stair climbing: a pilot study. Student Research and Creative Activity Fair, March 2019. Omaha, Nebraska.
70. Remski L, Buffum R, Lanier AS, Rosen A, Knarr BA. Force production variability during leg press in healthy individuals. Human Movement Variability Conference, May 2020. Omaha, Nebraska.
71. Hamer TJ, Rosen AB, Knarr BA. Development of a Comprehensive Evaluation to Assess Injury Risk in Collegiate Baseball Pitchers. Human Movement Variability Conference, September 2020. Omaha, Nebraska.
72. Kim N and **Knarr BA**. Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. Human Movement Variability Conference, May 2019. Omaha, Nebraska.
73. Buffum R, Rosen A, **Knarr BA**. Evaluation of leg press instrumentation. Human Movement Variability Conference, May 2019. Omaha, Nebraska.
74. Kim N and **Knarr BA**. Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. Student Research and Creative Activity Fair, March 2019. Omaha, Nebraska.
75. Ouattas A, Parker S, Youn J, **Knarr B**. Stability Measures to Compare Fallers and Non-Fallers During Locomotion. Fourth Annual Human Movement Variability Conference, May 2019, Omaha, NE, USA.
76. Ouattas A, Parker S, Youn J, **Knarr B**. Stability Measures to Compare Fallers and Non-Fallers During Locomotion. Research and Creative Activity Fair, March 2019, Omaha, NE, USA.
77. Parker S, Ouattas A, **Knarr BA**. Reliability of IMU system Compared to Motion Capture. Human Movement Variability Conference. May 2019. Omaha, Nebraska.
78. Parker S, Ouattas A, Youn JH, **Knarr BA**. IMU to Motion Capture Based Nonlinear Limb Joint Variability Based Kinematics Comparison. Research and Creative Activity Fair. March 2019. Omaha, Nebraska.

79. Hamer T, Ouattas A, Nimtz K, Boese K, **Knarr BA**. The Effects of Aging and Knee Arthroplasty on Joint Angle Variability Across Terrains. Office of Research and Creative Activity (ORCA) Fair, March 2019. Omaha, NE.
80. Hamer T, Ouattas A, Nimtz K, Boese K, **Knarr BA**. The Effects of Aging and Knee Arthroplasty on Joint Angle Variability Across Terrains. Human Movement Variability Conference, May 2019. Omaha, NE.
81. Andreasen SC, Wright T, Crenshaw JR, Reisman DS, **Knarr BA**. Determining the relationship between walking activity and inter-day patterns in stroke survivors. Research and Creative Activity Fair. March 2019. Omaha, NE.
82. Remski L, Ackerman J, Lanier AS, Snyder-Mackler L, Buchanan TS, **Knarr BA**. Gait variability after anterior cruciate ligament injury and implications for return-to-play testing. Research and Creative Activity Fair, March 2019.
83. Silva L, Likens A, Rowen D, Vaz J, **Knarr BA**, Stergiou N. Multifractal Analysis of Visually Cued Stride Intervals. 4th Annual Human Movement Variability Conference. May 2019. University of Nebraska at Omaha.
84. Silva L, Likens A, Rowen D, Vaz J, **Knarr BA**, Stergiou N. Synchronization between Stride Time Intervals and External Visual Cueing. 4th Annual Human Movement Variability Conference. May 2019. University of Nebraska at Omaha.
85. Hamer T, Ouattas A, Nimtz K, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
86. Nimtz K, Ouattas A, **Knarr BA**. The Relationship between Linear and Nonlinear Analysis on Activity Data. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
87. Ouattas A, Nimtz K, **Knarr BA**. Knee Proprioception impairments post Total Knee Arthroplasty. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
88. Schleu M, **Knarr BA**. Non-linear analyses for assessing static and dynamic variability using smartphone sensor data. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
89. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. 2018 Center for Biomechanical Engineering Research (CBER) Symposium, 18 May 2018. Newark, DE.
90. Schleu M, **Knarr BA**. Quantifying Static and Dynamic Stability Using Mobile Sensors. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
91. Hamer T, Ouattas A, Nimtz N, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
92. Buffum R, **Knarr BA**. Low cost Instrumentation for Measuring Asymmetries with a Leg Press. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
93. Nimtz K, Ouattas A, **Knarr BA**. The Relationship between Linear and Nonlinear Analysis on Activity Data. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
94. Harrison M, **Knarr BA**. Impact of Real World Environments on Movement Variability. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
95. Dudley D, **Knarr BA**, Zuniga J. The Effects of an Upper Limb Exoskeleton on Brain Activation of a Stroke Patient. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
96. Ouattas A, **Knarr BA**. Knee Joint Proprioception: Effect on Inter-Limb Joint Asymmetry & Dynamic Stability in Post-Total Knee Arthroplasty Patients. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
97. Barajas M, Buffum R, Sack S, Hamer T, **Knarr BA**. Temporal Step Coordination While Walking with a Single Point Cane. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
98. Ray NT, **Knarr BA**, Higginson JS. Changes in speed during normal and user-driven treadmill walking. Mechanical Engineering Research Day. University of Delaware, 2017.
99. Groff BR, Antonellis P, **Knarr BA**, Stergiou N. Movement variability and sensorimotor cortical activation during backward and forward walking. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
100. Schleu M, **Knarr BA**. Quantifying static and dynamic stability using mobile sensors. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
101. Nimtz K, Marmelat V, **Knarr BA**. Non-linear analysis of vector magnitude and step count from activity monitor data. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
102. Ouattas A, Ray NT, **Knarr BA**. Peak vertical ground reaction force and stance phase time to assess post-TKA interlimb symmetry. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
103. Sack S, Schleu M, **Knarr BA**. Design of an instrumented cane for real-time force feedback. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
104. Reed C, **Knarr BA**. Impact of Real World Environments of Movement Variability. University of Nebraska at Omaha Research and Creative Activity Fair 2017.

105. Ouattas A, Ray N, **Knarr BA**. Vertical ground reaction force & stance phase time to assess post-TKA interlimb asymmetry, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
106. Antonellis P, Ray N, **Knarr BA**. Detecting inter-limb differences in movement variability post-TKA using acceleration, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
107. Nimitz K, Ray N, **Knarr BA**. Difference in inter-limb knee joint angle variability in patients post-TKA, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
108. Reed C, **Knarr BA**. Impact of Real World Environments on Movement Variability, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
109. Kempfski K, Higginson JS, **Knarr BA**. Interlimb Comparison of Joint Angle Variability Post-Stroke. University of Delaware Undergraduate Research and Service Celebratory Symposium 2016.
110. Ray N, **Knarr BA**. Validation of a real-time adaptive treadmill controller as a clinical research tool. University of Delaware CBER Day Conference 2016.
111. Richardson RT, Quinton R, **Knarr BA**, Russo S, Higginson JS, Richards R. Evaluation of glenohumeral muscle moment arms of a new musculoskeletal model of the shoulder. University of Delaware CBER Day Conference 2016.
112. Ray N, Marmon A, Zeni J, **Knarr BA**. Using acceleration to detect aberrant loading patterns. University of Delaware CBER Day Conference 2016.
113. Nicholson MC, Higginson JS, **Knarr BA**. Knee contact forces and cost of locomotion in stride length controlled walking cases. University of Delaware CBER Day Conference 2016.
114. Justice W, **Knarr BA**. Which Partial Weight Bearing Percentage will be Easiest for Patients to Comply With? University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
115. McCarren G, Richards J, **Knarr BA**. Reducing Torque on the Low Back of Golfers. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
116. Nicholson MC, Higginson JS, **Knarr BA**. Knee Contact Forces and Cost of Locomotion in Constant String Length Walking Cases. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
117. Collin Patterson, Higginson JS, **Knarr BA**. Development and Validation of the SmartBoot: A Biofeedback Device for Partial Weight Bearing Rehabilitation. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
118. Schulman M, Higginson JS, **Knarr BA**. Knee Joint Loading Cost of Locomotion with Changing Stride Length at a Normal Speed. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
119. Zakutney L, Higginson JS, **Knarr BA**. Knee Joint Loading Cost of Locomotion in Response to Varying Stride Lengths at a Slow Speed. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
120. Doolin MT, Higginson JS, **Knarr BA**. Evaluation of multiple training paradigms when using biofeedback for learning partial weight bearing. University of Delaware Undergraduate Research and Service Celebratory Symposium 2014.
121. Nicholson MC, Higginson JS, **Knarr BA**. Biofeedback Modality: Is audio or visual a more effective method for training gait asymmetries? University of Delaware Undergraduate Research and Service Celebratory Symposium 2014.
122. **Knarr BA**, Roos MA, Reisman DS. The relationship between walking speed and intensity of daily walking activity in individuals post-stroke. . University of Delaware CBER Day Conference 2014.
123. Khoweilar R, **Knarr BA**, Higginson JS. Muscle Driven Forward Dynamic Simulation of Maximal Vertical Jumping in Three Dimensions. University of Delaware CBER Day Conference 2013.
124. Stanhope VA, **Knarr BA**, Higginson JS. Investigation of Factors associated with Self-Selected Walking Speed in Individuals Post-Stroke. University of Delaware CBER Day Conference 2013.
125. Richardson RT, Thomas KF, **Knarr BA**, Higginson JS. Assessment of Musculoskeletal Models of the Upper Extremity. University of Delaware CBER Day Conference 2013.
126. Seymour KM, Higginson JS, **Knarr BA**. Effect of handrail use on gait patterns in young healthy subjects. University of Delaware CBER Day Conference 2013.
127. **Knarr BA**, Higginson JS. Change in Knee Contact Force Due to Model Kinematics Processing. Center for Biomedical Engineering Research Symposium May 2013, Newark, DE.
128. **Knarr BA**, Zeni JA, Higginson JS. Change in Knee Contact Force with Experimental and Simulated Change in Body Weight. Center for Biomedical Engineering Research Symposium May 2012, Newark, DE.
129. **Knarr BA**, Kesar TM, Helm E, Reisman DS, Binder-Macleod SA, Higginson JS. Evaluation of muscle control strategy changes in post-stroke gait after a functional electrical stimulation intervention using musculoskeletal simulations. Center for Biomedical Engineering Research Symposium May 2010, Newark, DE.

130. **Knarr BA**, Higginson JS. Compensatory Strategies with modeled Muscle Activation Deficiency during Gait. Center for Biomedical Engineering Research Symposium May 2009, Newark, DE.
131. **Knarr BA**, Novotny JE, Zhou H. Finite Element Model of the Biceps Brachii muscle driven by in vivo strain and deformation data. Center for Biomedical Engineering Research Symposium May 2008, Newark, DE.
132. Novotny JE, **Knarr BA**, Zhou H. Strains in the biceps brachii during dynamic elbow flexion show concentric, eccentric and isometric behavior simultaneously. Center for Biomedical Engineering Research Symposium May 2007, Newark, DE.

Complete list of my published work in PubMed:

<https://www.ncbi.nlm.nih.gov/sites/myncbi/brian.knarr.1/bibliography/47511147/public>

Impact of my publications based on citations identified by Google Scholar:

https://scholar.google.com/citations?hl=en&user=gPmDAFsAAAAJ&view_op=list_works